Prescribed burns and other low-intensity fires are highly responsive to changes in winds

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LOS ALAMOS, N.M., March 4, 2021—Scientists at Los Alamos National Laboratory and partners have used modeling to highlight the large impact that small changes in wind conditions can have on low-intensity fires or prescribed burns. Conducting safe prescribed fires depends on anticipating the range of potential fire behavior associated with complex wind conditions.

“This study has important implications for the future use of observations to aid in model development,” said Alexandra Jonko, a computational earth scientist at Los Alamos, whose team authored an article published in a special issue in *MDPI Atmosphere*. “Adequately characterizing variations in the wind at multiple scales is critical. Ultimately, this work will lead to scientific improvements that will allow prescribed fire managers to conduct burns based on a better understanding of possible fire behavior.”

The Los Alamos scientists collaborated with the U.S. Forest Service, Eglin Air Force Base, and Tall Timbers Research Station to model a low-intensity experimental fire conducted at Eglin as part of the Prescribed Fire Combustion and Atmospheric Dynamics Research Experiment (RxCADRE).

Wind sensors set up around the burn plot measured wind speed and direction. The team used Los Alamos’ physics-based FIRETEC fire-modeling tool to represent the interactions between fire and atmosphere during the burn.

“We performed simulations of the burn using measurements from different wind sensors, as well as combinations of multiple sensors. We found that the simulated fires were very sensitive to timing and direction of localized gusts picked up by individual sensors,” Jonko said.

Predicting how a low-intensity fire will burn after interacting with vegetation, terrain, wind conditions, and even the fire geometry itself is especially complex. Process-based fire models are increasingly used to understand these interactions and help develop tools to assist with prescribed-fire decision making, which makes it crucial to test their reliability in marginal burn conditions.

The paper: “Modeling Low Intensity Fires: Lessons Learned from 2012 RxCADRE,” Rodman R. Linn, Judith L. Winterkamp, James H. Furman, Brett Williams, J. Kevin Hiers, Alexandra Jonko, Joseph J. O’Brien, Kara M. Yedinak, and Scott Goodrick, *MDPI Atmosphere*, Jan. 22, 2021.

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